

Trend Study 17-26-02

Study site name: Orem Water Tank.

Vegetation type: Oak/Seeding.

Compass bearing: frequency baseline 38 degrees magnetic.

Frequency belt placement: line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft).

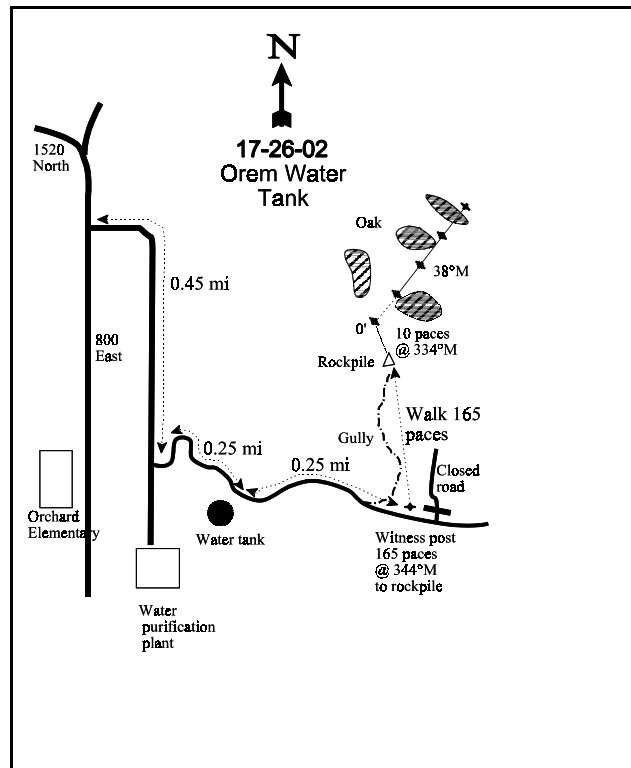
LOCATION DESCRIPTION

You will need a key from Orem City to access this site. On the north side of Orem, go east up 1600 North (which turns into 1520 North) to 800 East. Just south of this intersection on 800 East, turn up the road towards the water purification plant. Go 0.45 miles, turn left and go 0.25 miles to a water tank. Continue on this road 0.25 miles and park. The old road towards the study site is closed, but a witness post should mark the junction. From there, walk about 165 paces (275 yards) to a rock pile at the head of a small drainage or gully. From the rockpile, walk north 10 paces at 334 degrees magnetic to the 0-foot baseline stake at the edge of the oakbrush. It is marked by a red browse tag #3913.



Map Name: Orem

Township 6S, Range 2E, Section 1



Diagrammatic Sketch

GPS: NAD 27, UTM 12S 4464115 N 443686 E

DISCUSSION

Orem Water Tank - Trend Study No. 17-26

This study was established in 1983 on a burned and seeded oakbrush community immediately north of the Orem Water Treatment Plant. Slope is moderately steep ranging from about 8% at the base of the slope to 30% near the top. Aspect is south to southwest at an elevation of 5,260 feet. In the summer of 1996, a fire burned through the area again wiping out what browse had come back from the previous fire. Resprouting Gambel oak is the exception. Deer use has been heavy in the past, but only light hedging is noted in 1997. Deer pellet groups were frequent with some scattered elk pellet groups. Livestock are excluded to protect watershed quality. In 1983, grasshopper damage was apparent on the oak, but not enough to impact vigor. Data from a pellet group transect read on site in 2002 estimated 49 deer and 60 elk days use/acre (121 ddu/ha and 147 edu/ha). Most of the deer and elk use appeared to be from winter and spring.

Soil at the site is moderately deep with an effective rooting depth estimated at 13 inches. Textural analysis indicates a clay loam soil with a neutral soil reaction (pH at 6.7). The average soil temperature was 58.2°F at 14 inches in depth. A dense cover of seeded grasses and litter provides adequate soil protection.

Gambel oakbrush has been the dominant browse species on the site since the study was established in 1983. It had a density of between 15,000 and 14,000 stems/acre in 1983 and 1989. Mature plants averaged between 3 and 4 feet in height. The fire that swept through the area in 1996 burned all of the oak clones on the site. Estimated density of resprouting oakbrush was estimated at 10,560 stems/acre in 1997. Unlike other browse species, it is likely that many of the plants classified as seedling on this site will survive to maturity. During the 2002 reading, density of oak was estimated at nearly 19,000 stems/acre. Average height has increased from 13 inches in 1997 to 31 inches in 2002, while cover has more than doubled. Use of oak was light.

Mountain big sagebrush had a low density of only 333 plants/acre in 1989. All sagebrush plants were consumed by the 1996 fire. None were sampled in 1997 or 2002. Fourwing saltbush was seeded but not encountered in the density strips in any reading.

Seeded perennial grasses have established well and dominate the herbaceous understory. Smooth brome is the dominant grass in the Gambel oak understory, while intermediate wheatgrass and crested wheatgrass are dominant in the interspaces. Low amounts of annual grass species, cheatgrass, Japanese brome, and six weeks fescue are present but the density of perennial grasses should suppress these annuals from becoming abundant. Alfalfa is the dominant forb. It is healthy and robust, while showing signs of utilization. Other perennial forbs were seldom encountered.

1983 APPARENT TREND ASSESSMENT

The soil is stable with abundant protective ground cover. Gambel oak and seeded perennial grasses are dominant. From a management point of view, the area provides an abundant, but low diversity diet for deer. Any management action that could increase browse diversity would be welcome.

1989 TREND ASSESSMENT

Vegetation cover increased slightly while litter cover declined slightly. Perennial grasses contribute significant amounts of litter cover. Along with leaf litter from oak brush, litter provide 95% of the ground cover. The soil trend is stable. The browse trend is down and poor. Gambel oak is the only common species, but provides poor winter forage. Mountain big sagebrush remains at a low density and all plants sampled were classified as decadent. Drought conditions combined with intense competition with perennial grasses make seedling establishment difficult. Trend for the herbaceous understory is stable. Sum of nested frequency for the most abundant perennial grasses, intermediate wheatgrass and smooth brome, has remained stable.

TREND ASSESSMENT

soil - stable (3)

browse - down and poor (1)

herbaceous understory - stable (3)

1997 TREND ASSESSMENT

The soil trend is stable. Although bare ground cover has increased because of the recent fire event, there is still adequate vegetative and litter cover to protect the soil from erosion. Gambel oak will continue to grow and provide additional protection as well. At this time it is difficult to assess the browse trend. All mountain big sagebrush plants were destroyed by the fire, but the most recent reading estimated only 333 plants/acre. Gambel oak is the key forage species at this time and it will continue to grow in height. Browse trend is stable, although the establishment of other forage species should be encouraged. Herbaceous understory trend is stable with many of the same species present now that were present prior to the fire. Smooth brome will continue to dominate the understory and protect the watershed. Forb diversity is high, although many of the species are sparse.

TREND ASSESSMENT

soil - stable (3)

browse - stable (3)

herbaceous understory - stable (3)

2002 TREND ASSESSMENT

Trend for soil is up. Vegetation and litter cover have increased substantially while cover of bare ground has declined to a very low level. Protective ground cover is abundant and there is no soil erosion occurring on this site. There are no shrubs on the site except for Gambel oak which resprouted after the 1996 fire. Oak provides some cover but it is deciduous and poor winter forage. Most use on oak occurs in the spring and fall. Oakbrush has more than doubled in cover and nearly doubled in density. Average height has increased from 13 inches to 31 inches. Deer and elk do not appear to be browsing the oak but this area is good elk winter range due to the abundance of perennial grasses. The browse trend is considered stable but lacking in diversity. Trend for the herbaceous understory is stable. Sum of nested frequency of perennial grasses and forbs is similar to 1997. Smooth brome and intermediate wheatgrass continue to dominate the understory. The annuals, cheatgrass and Japanese brome, did increase in nested frequency which is a surprise considering the drought conditions which have occurred for the past few years. Cheatgrass now provides 26% of the grass cover.

TREND ASSESSMENT

soil - up (5)

browse - stable but poor (3)

herbaceous understory - stable (3)

HERBACEOUS TRENDS --
Herd unit 17 , Study no: 26

T y p e	Species	Nested Frequency				Quadrat Frequency				Average Cover %	
		'83	'89	'97	'02	'83	'89	'97	'02	'97	'02
G	Agropyron cristatum	_a 8	_a 1	_b 41	_{ab} 18	5	1	14	7	1.68	.45
G	Agropyron intermedium	173	166	103	121	68	60	35	42	4.96	6.98
G	Bromus inermis	235	268	232	224	76	83	74	67	13.45	18.14
G	Bromus japonicus (a)	-	-	_a 37	_b 60	-	-	12	25	.86	1.03
G	Bromus tectorum (a)	-	-	_a 105	_b 161	-	-	38	51	2.49	9.32
G	Poa bulbosa	-	-	-	3	-	-	-	2	-	.18
G	Poa pratensis	-	3	-	1	-	1	-	1	-	.00
G	Poa secunda	3	7	10	6	1	3	3	3	.06	.04
G	Vulpia octoflora (a)	-	-	2	3	-	-	1	1	.00	.00
Total for Annual Grasses		0	0	144	224	0	0	51	77	3.36	10.36
Total for Perennial Grasses		419	445	386	373	150	148	126	122	20.17	25.80
Total for Grasses		419	445	530	597	150	148	177	199	23.54	36.16
F	Alyssum alyssoides (a)	-	-	_b 101	_a 79	-	-	43	34	.73	.46
F	Astragalus spp.	-	2	-	-	-	2	-	-	-	-
F	Calochortus nuttallii	_b 20	_a 1	_b 14	_a 1	11	1	8	1	.04	.00
F	Collomia linearis (a)	-	-	-	1	-	-	-	1	-	.00
F	Descurainia pinnata (a)	-	-	10	5	-	-	5	3	.02	.01
F	Epipactis gigantea	-	-	2	-	-	-	1	-	.00	-
F	Erodium cicutarium (a)	-	-	_b 28	_a 16	-	-	12	5	.21	.51
F	Eriogonum racemosum	5	3	5	-	4	1	2	-	.03	-
F	Galium aparine (a)	-	-	6	4	-	-	2	2	.04	.01
F	Hedysarum boreale	_b 22	_a -	_a -	_a -	9	-	-	-	-	-
F	Holosteum umbellatum (a)	-	-	_a 2	_b 14	-	-	1	9	.00	.04
F	Lappula occidentalis (a)	-	-	7	-	-	-	4	-	.02	-
F	Lactuca serriola	-	-	2	-	-	-	2	-	.18	-
F	Linaria dalmatica	-	-	3	4	-	-	1	2	.03	.01
F	Medicago sativa	_a 14	_a 22	_b 99	_c 140	7	10	37	50	12.19	7.60
F	Polygonum douglasii (a)	-	-	2	-	-	-	1	-	.00	-
F	Sphaeralcea coccinea	6	8	6	-	4	3	3	-	.04	.00
F	Tragopogon dubius	1	-	5	-	1	-	2	-	.06	-
F	Zigadenus paniculatus	1	-	-	-	1	-	-	-	-	-
Total for Annual Forbs		0	0	156	119	0	0	68	54	1.04	1.04
Total for Perennial Forbs		69	36	136	145	37	17	56	53	12.59	7.62
Total for Forbs		69	36	292	264	37	17	124	107	13.64	8.67

Values with different subscript letters are significantly different at alpha = 0.10

BROWSE TRENDS --

Herd unit 17 , Study no: 26

Type	Species	Strip Frequency		Average Cover %	
		'97	'02	'97	'02
B	Chrysothamnus nauseosus albicaulis	1	0	-	-
B	Quercus gambelii	57	59	7.65	16.63
Total for Browse		58	59	7.65	16.63

CANOPY COVER -- LINE INTERCEPT

Herd unit 17 , Study no: 26

Species	Percent Cover	
	'97	'02
Quercus gambelii	-	24.83

BASIC COVER --

Herd unit 17 , Study no: 26

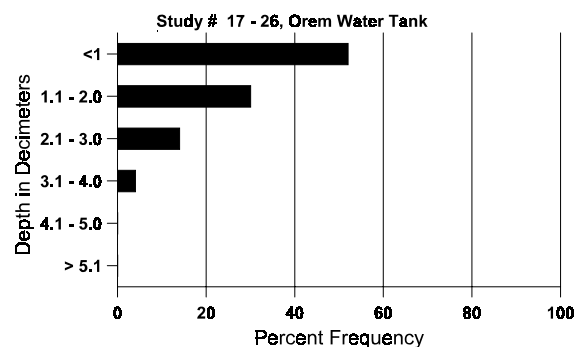
Cover Type	Nested Frequency		Average Cover %			
	'97	'02	'83	'89	'97	'02
Vegetation	349	368	1.50	3.00	42.85	59.75
Rock	206	57	.50	1.00	3.87	.69
Pavement	239	36	.75	1.00	1.99	.11
Litter	385	388	95.50	91.50	34.48	72.68
Cryptogams	1	2	.25	0	.00	.00
Bare Ground	307	30	1.50	3.50	23.51	1.08

SOIL ANALYSIS DATA --

Herd Unit 17, Study no: 26, Orem Water Tank

Effective rooting depth (in)	Temp °F (depth)	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
13.0	58.2 (14.3)	6.7	33.8	38.4	27.8	2.9	15.9	198.4	.7

Stoniness Index



PELLET GROUP FREQUENCY --

Herd unit 17 , Study no: 26

Type	Quadrat Frequency		Pellet Transect	
	'97	'02	Pellet Groups per Acre 02	Days Use per Acre (ha) 02
Elk	7	15	774	60 (147)
Deer	36	11	635	49 (121)

BROWSE CHARACTERISTICS --

Herd unit 17 , Study no: 26

A Y G R E		Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
Artemisia tridentata vaseyana																		
S	83	1	-	-	-	-	-	-	-	-	1	-	-	-	66		1	
	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	02	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
M	83	-	-	2	-	-	-	-	-	-	2	-	-	-	133	31	26	
	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	
	02	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	
D	83	-	-	4	-	-	-	-	-	-	4	-	-	-	266		4	
	89	-	1	3	-	1	-	-	-	-	2	-	3	-	333		5	
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	02	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'83		00%			100%			00%			-17%							
'89		40%			60%			60%										
'97		00%			00%			00%										
'02		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'83	399	Dec:	67%			
												'89	333		100%			
												'97	0		0%			
												'02	0		0%			
Atriplex canescens																		
M	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	
	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0	16	13	
	02	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'83		00%			00%			00%										
'89		00%			00%			00%										
'97		00%			00%			00%										
'02		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'83	0	Dec:	-			
												'89	0		-			
												'97	0		-			
												'02	0		-			

A G E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.	Total
		1	2	3	4	5	6	7	8	9	1	2	3	4			
Chrysothamnus nauseosus albicaulis																	
Y	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	97	-	-	1	-	-	-	-	-	-	1	-	-	-	20		1
	02	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'83		00%			00%			00%									
'89		00%			00%			00%									
'97		00%			100%			00%									
'02		00%			00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)												'83	0	Dec:	-		
												'89	0		-		
												'97	20		-		
												'02	0		-		
Gutierrezia sarothrae																	
D	83	2	-	-	-	-	-	-	-	-	2	-	-	-	133		2
	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	02	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'83		00%			00%			00%									
'89		00%			00%			00%									
'97		00%			00%			00%									
'02		00%			00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)												'83	133	Dec:	100%		
												'89	0		0%		
												'97	0		0%		
												'02	0		0%		

A G E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches)		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4		Ht.	Cr.	
Quercus gambelii																		
S	83	21	-	-	-	-	-	-	-	-	21	-	-	-	1400		21	
	89	26	2	-	12	-	-	-	-	-	32	2	2	4	2666		40	
	97	229	-	-	-	-	-	-	-	-	229	-	-	-	4580		229	
	02	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
Y	83	15	48	-	-	-	-	-	-	-	63	-	-	-	4200		63	
	89	117	9	-	9	-	-	-	-	-	132	-	3	-	9000		135	
	97	363	-	-	45	-	-	-	-	-	326	74	-	8	8160		408	
	02	116	-	-	7	-	-	24	-	-	147	-	-	-	2940		147	
M	83	-	124	-	-	40	-	-	-	-	164	-	-	-	10933	40 15	164	
	89	43	7	-	2	1	-	-	-	-	53	-	-	-	3533	46 19	53	
	97	120	-	-	-	-	-	-	-	-	104	16	-	-	2400	13 10	120	
	02	527	55	-	106	-	-	105	-	-	793	-	-	-	15860	31 16	793	
D	83	-	-	3	-	-	-	-	-	-	-	3	-	-	200		3	
	89	14	11	-	1	-	-	1	-	-	13	1	11	2	1800		27	
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	02	1	-	-	-	-	-	-	-	-	-	-	-	1	20		1	
X	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	8280		414	
	02	-	-	-	-	-	-	-	-	-	-	-	-	-	1320		66	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'83		92%			01%			00%			- 7%							
'89		13%			00%			07%			-26%							
'97		00%			00%			02%			+44%							
'02		06%			00%			.10%										
Total Plants/Acre (excluding Dead & Seedlings)												'83	15333	Dec:	1%			
												'89	14333		13%			
												'97	10560		0%			
												'02	18820		0%			